DRAWING AMENDMENTS

A replacement drawing sheet in which FIG. 1 is designated by the legend "Prior Art" is submitted herewith.

REMARKS

The amendments set forth above remove the objections raised in points 3, 4 and 5 on pages 2 and 3 of the Office Action and also remove the rejection under 35 USC 112, second paragraph.

Claims 1-4 stand rejected under 35 USC 102 or 35 USC 103 over either Hemsworth or Wisler. Claims 1-4 also stand rejected under 35 USC 103 over either Hemsworth or Wisler in view of Teshima et al.

The present invention is concerned with a rotary machine having a rotor (designated 11 in the embodiment shown in FIGS. 2 and 3 of the drawings), a stator (designated 16) and blade rows (12, 14) on the rotor and stator that impart a high swirl component to gases flowing through the machine. Denser impurities present in the gas are deflected radially outwards by centrifugal action onto the inner wall (17) of the stator, which is provided with a guide surface along which impurities separated by the centrifugal action from the main gas stream are entrained by the main gas stream and guided to flow from the gas intake side to the gas outlet side of the machine. The guide surface is radially stepped (30) to resist only reverse flow of the separated impurities back towards the gas intake side of the machine. At the downstream end of the machine, the guide surface discharges the separated impurities back into the main gas stream for the impurities to exit from the machine with the main gas stream. Thus, referring to FIG. 2, the continuous ramp surfaces between the steps 30 present relatively little resistance to impurities, such as liquid in the form of a film on the guide surface, passing towards the outlet side of the machine (being urged in that direction by viscous drag of the main gas stream) whereas the steps 30 present a much greater obstacle to impurities moving in the opposite direction, towards the intake side of the machine.

Hemsworth discloses a compressor section of an axial flow turbomachine having a stator provided with a stator row 14 having vanes 19 and a rotor provided with a rotor row 12 having blades 18. The flow path 20 for axial movement of air through the compressor section is bounded by an outer casing 22 with a radially inward facing surface 24 and an inner wall 26 with a radially outward facing surface 28. The inward facing surface 24 of the outer casing is formed with a circumferentially extending recess 72 disposed radially outward of the blade row 18. The recess 72 is defined by a radial wall 74 facing

towards the outlet of the compressor section, a generally axial wall 78 and a forward facing wall 76 disposed at an acute angle to the axis. The reason for this configuration of the recess 72 is to inhibit tip clearance flow around the tip of the blade 18. Accordingly, Hemsworth teaches that the distance 49 between the blade 18 and wall 74 should be about 10% of the blade circumferential spacing and that the distance 50 between the tip 80 and wall 78 should be approximately 0.1% of the diameter of the rotor row 12.

The disclosure of Wisler is essentially the same as that of Hemsworth, except that the base of the recess 60 is a conical rather than cylindrical surface.

Referring to the rejection under 35 USC 102, applicant agrees that neither Hemsworth nor Wisler discloses that impurities in the gas stream are directed onto the surface 24 of the outer casing 22. Applicant disagrees with the examiner's contention that Hemsworth discloses that the stepped stator guide surface separates "the outer fluid flow from the inner fluid flow," to the extent that the examiner suggests that the outer fluid flow is composed of impurities in the gas stream, since there is no suggestion in Hemsworth that impurities are present in the air stream or that impurities, if present, are confined to the tip clearance flow. One might just as well expect, based on the disclosure of Hemsworth, that if the air flow included impurities, the air flow would be homogenized and would be stratified based on density due to the swirling flow, so that although the concentration of impurities might be higher in the tip clearance flow than at the surface of the rotor, both the main stream and the tip clearance flow would nevertheless be multiphase.

In view of the foregoing, applicant submits that the invention as defined in claim 1 is not disclosed or suggested by Hemsworth or Wisler. Neither Hemsworth nor Wisler discloses a compressor for compressing gas having denser, non-gaseous impurities entrained therein. Both Hemsworth and Wisler are concerned with improving the aerodynamic efficiency of a compressor rather than providing a compressor that is adapted to handle a two-phase flow. Therefore, claim 1 is patentable and it follows that the dependent claims 2-6 also are patentable.

Claims 3-6 are patentable independently of claim 1 because the features defined in those claims are not disclosed or suggested by the cited documents, whether taken singly or in combination.

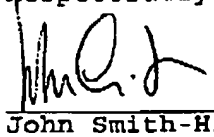
Teshima et al does not supply the deficiency in the disclosure of Hemsworth and Wisler. Whereas both Hemsworth and Wisler are concerned with the compressor section of an axial flow turbomachine, where there is no suggestion that the gas flow is other than of a single phase, Teshima et al is concerned with an axial flow turbine that is driven by a working fluid composed of hot air containing dust and moisture.

Applicant notes that the examiner has not contended that it would have been obvious to modify the compressor section of Hemsworth or Wisler in view of Teshima et al but relies on Teshima et al as showing that dust or other impurities in a gas stream flowing in a rotary machine will tend to remove radially outwards. Applicant believes that this does not provide a basis for a rejection under 35 USC 103 since the examiner is evidently relying on Teshima et al as disclosing what would happen to impurities in the gas stream fed to the compressor or Wisler or Hemsworth in the event that the gas stream contained impurities, and is not contending that it would have been obvious to modify the structure disclosed by Hemsworth or Wisler in view of the disclosure of Teshima et al. In any event, there is no suggestion in Hemsworth or Wisler that the compressor should be operated in a dusty environment. See, for example, column 1, line 16, of Wisler referring to aircraft engines.

Claim 7 is patentable over the disclosure of Hemsworth, Wisler and Teshima et al, whether taken singly or in combination. Claim 7 is patentable for the reasons presented in support of claim 1. In addition, claim 7 is drawn to a downhole compressor for installation in a well. The cited references do not disclose or suggest that the compressor section of Hemsworth or Wisler or the turbine of Teshima should be installed in a well. Applicant therefore submits that claim

7 is patentable. It follows that the dependent claims 8-12 also are patentable.

Respectfully submitted,



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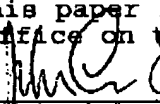

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